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Applicant:	Venkata A. BHAGAVATULA, et al.	Examiner:	Chandrika PRASAD
Serial No.:	09/812108	Art Unit:	2839
Filing Date:	2001-03-19		
Title:	Optical Waveguide Lens and Method of Fabrication		

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BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated March 9, 2006, in the application identified above. The Examiner issued an advisory action dated July 19, 2006, indicating the amended claims were not in a condition for allowance. Appellant filed the Notice of Appeal on June 9, 2006, and now submits this Brief as required by 37 C.F.R. §1.192(a). This Brief addresses the issues raised in the final rejection. It is believed that a three-month extension of time is required for the Brief to be timely filed. Therefore, a petition under 37 CFR §1.36(a) is included herewith.

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APPLICATION NO. 09/812108

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated pursuant to the Assignment recorded on June 29, 2001, at Reel 011951 and Frame 0008.

II. RELATED APPEALS AND INTERFERENCES

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, to the best of the knowledge of the undersigned, there are none.

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III. STATUS OF CLAIMS

Claims 1-13 and 18-53 were finally rejected in an Office Action dated March 9, 2006. Claims 1-13, 18-36, 41, and 46-53 are the pending claims that are the subject of this appeal and are set forth in the attached Claims appendix. Claims 14-17 have been cancelled as a result of a previous amendment.

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IV. STATUS OF AMENDMENTS

An amendment was filed on June 9, 2006, subsequent to final rejection, requesting cancellation of claims 37-40 and 42-45. This amendment has been entered, as indicated in the Advisory Action dated July 19, 2006.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 relates to an optical waveguide lens for collimating or focusing a light beam having a mode field diameter measured at a beam waist when the light is transmitted through the optical waveguide lens into free space. An optical waveguide lens (10 in FIGS. 1-8, 15, 17, 18) includes an optical waveguide (12 in FIGS. 1-8, 15, 17, 18) having an end through which light propagates. The optical waveguide lens further includes a lens member (14 in FIGS. 1-8, 15, 17, 18) integrally attached to and extending from the end of the optical waveguide (page 9, lines 2-4). The lens member has a throat portion (16 in FIGS. 1-8) and a generally spherical lens portion (18 in FIGS. 1-8). The throat portion has a cross-sectional dimension substantially greater than the diameter of the optical waveguide (page 9, lines 9-11).

Claim 18 relates to an optical waveguide lens for collimating or focusing a light beam. An optical waveguide lens (10 in FIGS. 1-8, 15, 17, 18) includes an optical waveguide (12 in FIGS. 1-8, 15, 17, 18) having a core fabricated from a glass having a softening point, a cladding, and an end through which the light propagates. A lens member (14 in FIGS. 1-8, 15, 17, 18) is integrally attached to and extends from the end of the optical waveguide. The lens member has a generally spherical lens portion (18 in FIGS. 1-8) and is fabricated from a glass having a softening point that is less than the softening point of the core of the optical waveguide (page 13, lines 29-30).

Claim 22 relates to a method of fabricating an optical waveguide lens for collimating or focusing a light beam. An optical waveguide (12 in FIG. 10) having an end through which a light beam is transmitted, a diameter, and an axis is provided. A lens blank (34 in FIG. 10) having a face defining a cross-sectional dimension substantially greater than the diameter of the optical waveguide and a softening point is also provided. The lens blank is integrally attached to the optical waveguide such that the end of the optical fiber contacts and is fused to the face of the lens blank (page 12, lines 6-11, FIG. 11). A portion of the lens blank is heated above the softening point. Tension is applied to the lens blank such that the lens blank is drawn and separated to form a tapered distal end connected to and extending from the optical waveguide (page 12, lines 11-22, FIGS. 12, 13). The tapered distal end of the lens blank is heated above the softening point such that a generally spherical lens portion having a diameter is formed in general alignment with the axis of the optical waveguide and through which the light beam is

transmitted, and such that a throat portion of the lens blank disposed between the optical waveguide and the generally spherical lens portion has a cross-sectional dimension substantially greater than the diameter of the optical waveguide and substantially less than the diameter of the generally spherical lens portion (page 12, lines 23-32, FIGS. 14, 15).

Claim 25 relates to a method for fabricating an optical component wherein a light beam propagates through free space relative to an optical device (page 15, lines 23 – page 16, line 10). An optical waveguide lens (10 in FIG. 22) including an integrally attached optical waveguide having a diameter and an axis, a throat portion connected to and extending from the optical waveguide, and a generally spherical lens portion connected to and extending from the throat portion is provided. The throat portion has a cross-sectional dimension substantially greater than the diameter of the optical waveguide. The generally spherical lens portion has a diameter substantially greater than the cross-sectional dimension of the throat portion. The optical waveguide lens is positioned relative to an optical device (50 in FIG. 22) such that the light beam propagates from the optical waveguide lens to the optical device or from the optical device to the optical waveguide lens or both. The optical waveguide lens is secured relative to the optical device.

Claim 35 relates to a method for fabricating an optical waveguide lens assembly. An optical waveguide (12 in FIGS. 16-18) having a diameter and a distal end is provided. A ferrule (42 in FIGS. 16-18) having an end surface and defining a bore (44 in FIGS. 16-18) extending therethrough is also provided. The bore of the ferrule has a diameter equal to or greater than the diameter of the optical waveguide. The optical waveguide is inserted through the bore of the ferrule such that a segment of the distal end of the optical waveguide is exposed (page 14, line 31 – page 15, line 5). A lens member (14 in FIGS. 17-18) including a generally spherical portion is integrally formed on the distal end of the optical waveguide (page 15, lines 5-6). The optical waveguide is then retracted through the optical waveguide through the bore of the ferrule such that a portion of the lens member contacts the end surface of the ferrule and the optical waveguide is secured in position relative to the ferrule (page 15, lines 7-11).

Claim 36 relates to a method for fabricating a plurality of generally spherical lenses each having a mounting post extending therefrom. An elongated stock of a glass material (34 in FIG. 19) is provided (page 15, lines 14-15). A generally spherical lens (10 in FIG. 20) is integrally formed on the distal end of the elongated stock by heating the glass material above its softening

point such that a portion of the elongated stock forms the spherical lens due in part to a surface tension of the glass material (page 15, lines 15-16). The generally spherical lens has a diameter substantially greater than the cross-sectional dimension of the elongated stock. The generally spherical lens and a segment of the elongated stock connected to the generally spherical lens are separated from a remaining portion of the elongated stock such that the segment of the elongated stock connected to the generally spherical lens forms the mounting post (46 in FIG. 21) for the generally spherical lens (page 15, lines 16-18). Forming the generally spherical lens and separating the generally spherical lens are repeated to fabricate the plurality of generally spherical lenses that each has the mounting post extending therefrom.

Claim 41 relates to an optical waveguide lens for collimating or focusing a light beam. An optical waveguide lens (10 in FIGS. 1-8, 15, 17, 18) includes an optical waveguide (12 in FIGS. 1-8, 15, 17, 18) having an end through which a light beam propagates. A lens member (14 in FIGS. 1-8, 15, 17, 18) is integrally attached to and extends from the end of the optical waveguide. The lens member has a generally spherical lens portion (18 in FIGS. 1-8) and is fabricated from a borosilicate glass (page 14, lines 4-5).

Claim 46 relates to an optical waveguide lens assembly for collimating or focusing a light beam. An optical waveguide (12 in FIGS. 1-8, 15, 17, 18) has a core and a cladding. A lens member (14 in FIGS. 1-8, 15, 17, 18) is connected integrally to the end of the optical waveguide. The lens member has a throat portion (16 in FIGS. 1-8) and a lens portion (18 in FIGS. 1-8). The optical waveguide is connected to the throat portion, where the cross-sectional dimension of the throat portion differs substantially from the diameter of the optical waveguide at or proximate to a point where the throat portion is connected to the optical waveguide (page 9, lines 5-11).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-13, 18-36, 41, and 46-53 are unpatentable under 35 U.S.C. §103(a) over Seiji (JP 54066152).

VII. ARGUMENTS

Rejection under 35 U.S.C. §103(a) over Seiji (JP 54066152)

In the final Office Action dated March 9, 2006, the Examiner rejected claims 1-13, 18-36, 41, and 46-53 under 35 U.S.C. §103(a) as being unpatentable over Seiji (JP 54066152). Claims 2-13 ultimately depend from claim 1, claims 19-21 ultimately depend from claim 18, claims 23-24 ultimately depend from claim 22, claims 26-34 ultimately depend from claim 25, and claims 47-53 ultimately depend from claim 46. Claims 1-13, 18-36, 41, and 46-53 do not stand or fall together, as separately argued below.

Claims 1-2, 5-13, 25, 29-35, 46, 50-53

In the final Office Action of March 9, 2006, the Examiner stated that Seiji shows all the features of claims 1-2, 5-13, 25, 29-35, 46, 50-53 except for lens made integral with the waveguide. The Examiner asserted that it would have been obvious to one of ordinary skill in the art at the time of the instant invention to make the lens integral with the waveguide. Citing Howard v. Detroit Stove Works, 150 US 164 (1893), the Examiner further asserted that forming in one piece an article formerly made in two pieces and put together involves only routine skill in the art.

Appellant submits that there is no rule per se that making something in one piece that was formerly made in two pieces renders the one piece device obvious, particularly when the prior art teaches away from making the two pieces into one piece.

In the translation of Seiji, Seiji states that, "the purpose of the present invention is to provide a lens terminal for optical transmission, which has a simple structure, can make the adjustment [of orientation of a parallel beam] easily, and can be realized at low cost." Seiji is concerned with providing a lens terminal for optical transmission that is capable of being easily adjusted so that the luminous flux that is incident or exits in parallel in coordination with a luminous flux reference plane of a peripheral apparatus can be conformed favorably to an external optical circuit such as an optical fiber, an optical element, and the like. Seiji provides a spherical lens that is adjustable relative to an external optical circuit so that the incident light and

exit light of the lens is parallel with respect to a peripheral apparatus attached to the lens or an optional reference plane.

Seiji discloses a spherical lens (11) having one plane cut so as to include a spherical core (10) and a glass block (12). In FIG. 2, Seiji shows an optical fiber (13) adjacent to the spherical lens (11) in order to illustrate the approximate focal point position of the spherical lens (11). Seiji does not suggest attaching the spherical lens (11) to the optical fiber (13). Instead in FIG. 3 and subsequent figures, Seiji discloses adjustably attaching the spherical lens (11) to a peripheral apparatus (14). The peripheral apparatus (14) includes an adjusting jig (16) which engages the spherical lens (11) in order to adjust the angle of the spherical lens (11) with respect to a luminous flux reference plane (15). When an optical circuit such as an optical fiber (13) is positioned adjacent the peripheral apparatus (14), the adjusting jig (16) can be used to adjust the angle of the spherical lens (11) such that the incident light according to the optical fiber (13) and the exit light from the spherical lens (11) can be made parallel to each other.

Seiji teaches attaching a spherical lens (11) having one plane cut to include a spherical core (10) on the lens side to a peripheral apparatus (14) such that the angle of the spherical lens is adjustable relative to an optical fiber (13) positioned adjacent the peripheral apparatus (14). It has been held that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. In re Gurley, 27 F.3d 551, 31, USPQ2d 1130, 1131 (Fed. Cir. 1994). Appellant submits that one of ordinary skill in the art, upon reviewing the teachings of Seiji, would not be motivated to integrally attach the spherical lens of Seiji to an optical fiber where the stated objective of Seiji is to make adjustable the angle of the spherical lens relative to a reference plane such that the orientation of beams from the spherical lens and optical fiber are parallel. Appellant submits that Seiji teaches away from the invention as recited in claims 1-2, 5-13, 25, 29-35, 46, 50-53 and that claims 1-2, 5-13, 25, 29-35, 46, 50-53 are patentable over Seiji.

<u>Claims 18, 19, 26</u>

In the final Office Action dated March 9, 2006, the Examiner stated that Seiji shows all the features of claims 18, 29, and 26 except for the material of the lens member and the core of the waveguide. The Examiner asserted that it would have been obvious to one of ordinary skill

in the art at the time of the instant invention to make the lens integral with the waveguide and the lens member having a softening point less than that of the core of the waveguide since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. Appellant respectfully disagrees.

Appellant submits that the limitation in the claims 18, 29, and 26 that the lens member is fabricated from a glass having a softening point that is less than the softening point of the core of the optical waveguide is more than mere selection of material suitable for the intended use of the optical waveguide lens. With the lens material having a lower softening point than the core of the optical waveguide, the lens material can be heated up such that the viscosity of the lens material is low enough to form a very good spherical surface by surface tension. A very good spherical shape provides low wave front aberrations, hence better quality beam. At the same time, because the core material for the optical waveguide has a higher softening point than the lens material, the core does not become distorted while the lens member is formed. Distortion of the core of the optical waveguide would result in excess loss. These aspects are important for an integrated device, which is not suggested by Seiji. Accordingly, claims 18, 19 and 26 are patentable over Seiji.

Claims 3, 4, 20-21, 27, 28, 41, 48, 49

In the final Office Action of March 9, 2006, the Examiner stated that Seiji shows all the features of these claims except for the material of the lens member and the core of the waveguide. The Examiner asserted that it would have been obvious to one of ordinary skill in the art at the time of the instant invention to make the lens integral with the waveguide and the lens member of borosilicate glass since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. Appellant disagrees.

Appellant submits that the limitation in claims 3, 4, 20-21, 27, 28, 41, 48, and 49 that the lens member is fabricated from a borosilicate glass is more than mere selection of material suitable for the intended use of the optical waveguide lens. The use of borosilicate glass improves performance of the optical waveguide lens. As discussed on page 14 of the instant application, when a lens member made of borosilicate glass is spliced to an optical waveguide made of silica, the borosilicate lens member causes thermal core broadening, which enlarges the

mode field diameter and increases the tolerance for lateral misalignment of the optical waveguide to the lens member. Appellant submits that there is inventiveness in selecting the material of the lens member to achieve thermal core broadening and increase in tolerance for lateral misalignment and that desirability of these features are not disclosed or suggested by Seiji. Accordingly, claims 3, 4, 20-21, 27, 28, 41, 48, 49 are patentable over Seiji.

Claims 22-24

In the final office action dated March 9, 2006, the Examiner merely stated that Seiji teaches a method of making a lens. However, the Examiner failed to establish how Seiji's teachings make obvious a method of fabricating an optical waveguide lens as recited in claims 22-24. A proper *prima facie* of showing of obviousness requires the Examiner to "state clearly and specifically any objections to patentability, and give the applicant fair opportunity to meet those objections with evidence and argument." See In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443, 1447 (Fed. Cir. 1992).

Seiji teaches that a spherical lens is fabricated by cutting one plane, presumably of a ball lens, so as to include a spherical core on the lens side. A glass block is attached to the cut plane. The spherical lens and glass block are then mounted in a peripheral apparatus equipped with an adjusting jig, where the adjusting jig engages the glass block and is operable to adjust the angle of the spherical lens. An optical fiber is positioned at an end of the peripheral apparatus and is not coupled to the spherical lens.

Claims 22-24 recite a method for fabricating an optical waveguide lens which includes integrally attaching a lens blank to an optical waveguide such that the end of the optical fiber contacts and is fused to the face of the lens blank. A portion of the lens blank is heated above the softening point of the lens blank. Tension is applied to the lens blank such that the lens blank is drawn and separated to form a tapered distal end connected to and extending from the optical waveguide. The tapered distal end of the lens blank is heated above the softening point such that a generally spherical lens portion having a diameter is formed in general alignment with the axis of the optical waveguide. None of these steps are disclosed or taught by Seiji. Accordingly, claims 22-24 are patentable over Seiji.

Claim 36

In the final Office Action of March 9, 2006, the Examiner stated that Seiji teaches a method of making a lens. However, the Examiner failed to establish how Seiji's teachings make obvious a method of fabricating a plurality of spherical lenses each having a mounting post extending therefrom as recited in claim 36. A proper *prima facie* of showing of obviousness requires the Examiner to "state clearly and specifically any objections to patentability, and give the applicant fair opportunity to meet those objections with evidence and argument." See In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443, 1447 (Fed. Cir. 1992).

Seiji teaches that a spherical lens is fabricated by cutting one plane, presumably of a ball lens, so as to include a spherical core on the lens side. Seiji shows a glass block adjacent to the spherical lens. It is not clear from Seiji how the glass block is coupled to the spherical lens. In contrast, claim 36 recites a method of fabricating a plurality of generally spherical lens having mounting posts which includes heating a distal end of an elongated stock of glass material above the softening point of the glass material to form a generally spherical lens at the distal end. The generally spherical lens and a segment of the elongated stock connected to the generally spherical lens are separated from the remaining portion of the elongated stock. The segment of the elongated stock connected to the generally spherical lens forms a mounting post for the generally spherical lens. These steps are repeated to form the plurality of generally spherical lenses. None of these steps are disclosed by Seiji. Accordingly, claim 36 is patentable over Seiji.

Conclusion

In conclusion, Appellant respectfully requests reversal of the Examiner's rejection of claims 1-13, 18-36, 41, and 46-53 under U.S.C. §103(a) as being unpatentable over Seiji (JP 54066152) for the reasons discussed above.

If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to the Deposit Account 03-3325. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such an extension is requested and should also be charged to our Deposit Account.

Date: November 9, 2006

Respectfully submitted,

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VIII. CLAIMS APPENDIX

The claims on appeal are as follows:

1. (Rejected) An optical waveguide lens for collimating or focusing a light beam, the light beam having a mode field diameter measured at a beam waist when the light is transmitted through the optical waveguide lens into free space, the optical waveguide lens comprising:

an optical waveguide having an end through which the light propagates and a diameter; and

a lens member integrally attached to and extending from the end of the optical waveguide, the lens member having a throat portion and a generally spherical lens portion, the throat portion having a cross-sectional dimension substantially greater than the diameter of the optical waveguide.

2. (Rejected) The optical waveguide lens of claim 1 wherein the optical waveguide has a core and a cladding, the core being fabricated from a doped glass having a softening point, and wherein the lens member is fabricated from a generally homogeneous glass having a softening point less than the softening point of the core of the optical waveguide.

3. (Rejected) The optical waveguide lens of claim 1, wherein the lens member is fabricated from a generally homogeneous glass including a borosilicate glass.

4. (Rejected) The optical waveguide lens of claim 1 wherein the lens member is fabricated from a 4 weight percent borosilicate glass.

5. (Rejected) The optical waveguide lens of claim 1 wherein the optical waveguide has a diameter on the order of 125 microns and the cross-sectional dimension of the throat portion is greater than 135 microns.

6. (Rejected) The optical waveguide lens of claim 1 wherein the optical waveguide has a diameter on the order of 125 microns and the cross-sectional dimension of the throat portion is greater than 200 microns.

7. (Rejected) The optical waveguide lens of claim 1 wherein the cross-sectional dimension of the throat portion of the lens member is about 1.5 or more times diameter of the optical waveguide.

8. (Rejected) The optical waveguide lens of claim 1 wherein the mode field diameter of the light beam measured at the beam waist is greater than 30 microns.

9. (Rejected) The optical waveguide lens of claim 1 wherein the mode field diameter of the light beam measured at the beam waist is greater than 120 microns.

10. (Rejected) The optical waveguide lens of claim 1 wherein the mode field diameter of the light beam measured at the beam waist is greater than 200 microns.

11. (Rejected) The optical waveguide lens of claim 1 wherein the mode field diameter of the light beam measured at the beam waist is greater than 500 microns.

12. (Rejected) The optical waveguide lens of claim 1 wherein the mode field diameter of the light beam measured at the beam waist is between 200 and 800 microns.

13. (Rejected) The optical waveguide lens of claim 1 wherein the optical waveguide is selected from a group consisting of a single-mode optical fiber, a multi-mode optical fiber, a polarization-maintaining optical fiber, a dual-core optical fiber, a separable-core optical fiber, a circular cross-section optical fiber, and a non-circular cross-section optical fiber.

14-17. (Cancelled)

18. (Rejected) An optical waveguide lens for collimating or focusing a light beam, the optical waveguide lens comprising:

an optical waveguide having a core, a cladding, and an end through which the light propagates, the core being fabricated from a glass having a softening point; and

a lens member integrally attached to and extending from the end of the optical waveguide, the lens member having a generally spherical lens portion, the lens member being fabricated from a glass having a softening point that is less than the softening point of the core of the optical waveguide.

19. (Rejected) The optical waveguide lens of claim 18 wherein the optical waveguide has an axis, and the lens member has a generally uniform refractive index which does not vary in radial direction measured relative to the axis of the optical waveguide.

20. (Rejected) The optical waveguide lens of claim 18 wherein the lens member is fabricated from a generally homogeneous borosilicate glass.

21. (Rejected) The optical waveguide lens of claim 20 wherein the lens member is fabricated from a 4 weight percent borosilicate glass.

22. (Rejected) A method for fabricating an optical waveguide lens for collimating or focusing a light beam, the method comprising the steps of:

providing an optical waveguide having an end through which the light beam is transmitted, a diameter, and an axis;

providing a lens blank, the lens blank having a face defining a cross-sectional dimension substantially greater than the diameter of the optical waveguide, the lens blank having a softening point;

integrally attaching the lens blank to the optical waveguide such that the end of the optical fiber contacts and is fused to the face of the lens blank;

heating a portion of the lens blank above the softening point;

applying tension to the lens blank such that the lens blank is drawn and separated to form a tapered distal end connected to and extending from the optical waveguide; and

heating the tapered distal end of the lens blank above the softening point such that a generally spherical lens portion having a diameter is formed in general alignment with the axis of the optical waveguide and through which the light beam is transmitted, and such that a throat portion of the lens blank disposed between the optical waveguide and the generally spherical lens

portion has a cross-sectional dimension substantially greater than the diameter of the optical waveguide and substantially less than the diameter of the generally spherical lens portion.

23. (Rejected) The method of claim 22 wherein the lens blank is a generally homogeneous borosilicate glass.

24. (Rejected) The method of claim 23 wherein the lens blank is a 4 weight percent borosilicate glass.

25. (Rejected) A method for fabricating an optical component wherein a light beam propagates through free space relative to an optical device, the method comprising the steps of:

providing an optical waveguide lens including an integrally attached optical waveguide having a diameter and an axis, a throat portion connected to and extending from the optical waveguide, the throat portion having a cross-sectional dimension substantially greater than the diameter of the optical waveguide, and a generally spherical lens portion connected to and extending from the throat portion, the generally spherical lens portion having a diameter substantially greater than the cross-sectional dimension of the throat portion;

positioning the optical waveguide lens relative to the optical device such that the light beam propagates either from the optical waveguide lens to the optical device or from the optical device to the optical waveguide lens or both; and

securing the optical waveguide lens relative to the optical device.

26. (Rejected) The method of claim 25 wherein the optical waveguide has a core fabricated from a glass material having a softening point, the optical waveguide lens being fabricated from a glass material having a softening point which is less than the softening point of the core.

27. (Rejected) The method of claim 25 wherein the optical waveguide lens is fabricated from a borosilicate glass material.

28. (Rejected) The method of claim 27 wherein the optical waveguide lens is fabricated from a 4 weight percent borosilicate glass.

29. (Rejected) The method of claim 25 wherein the optical waveguide lens collimates the light beam propagating from the optical waveguide into the free space.

30. (Rejected) The method of claim 25 wherein the optical waveguide lens focuses the light beam propagating from the free space into the optical waveguide.

31. (Rejected) The method of claim 25 wherein the optical device is a passive optical component.

32. (Rejected) The method of claim 25 wherein the optical device is an active optical component.

33. (Rejected) The method of claim 22 wherein the optical device is selected from a group consisting of a multiplexing component or a demultiplexing component.

34. (Rejected) The method of claim 25 wherein the optical device is selected from a group consisting of a switch component, a router component, or an optical add/drop component.

35. (Rejected) A method for fabricating an optical waveguide lens assembly comprising the steps of:

providing an optical waveguide having a diameter and a distal end;

providing a ferrule defining a bore extending therethrough, the bore having a diameter equal to or greater than the diameter of the optical waveguide, the ferrule having an end surface;

inserting the optical waveguide through the bore such that a segment of the distal end of the optical waveguide is exposed;

integrally forming a lens member on the distal end of the optical waveguide, the lens member including a generally spherical portion;

retracting the optical waveguide through the bore such that a portion of the lens member contacts the end surface of the ferrule; and

securing the optical waveguide in position relative to the ferrule.

36. (Rejected) A method for fabricating a plurality of generally spherical lenses each having a mounting post extending therefrom, the method comprising the steps of:

providing an elongated stock of a glass material from which the plurality of generally spherical lenses are to be formed, the glass material having a softening point, the elongated stock having a distal end and a cross-sectional dimension;

integrally forming a generally spherical lens on the distal end of the elongated stock by heating the glass material above its softening point such that a portion of the elongated stock forms the spherical lens due in part to a surface tension of the glass material, the generally spherical lens having a diameter substantially greater than the cross-sectional dimension of the elongated stock;

separating the generally spherical lens and a segment of the elongated stock connected to the generally spherical lens from a remaining portion of the elongated stock, such that the segment of the elongated stock connected to the generally spherical lens forms the mounting post for the generally spherical lens; and

repeating the forming step and the separating step to fabricate the plurality of generally spherical lenses each having the mounting post extending therefrom.

37-40. (Cancelled)

41. (Rejected) An optical waveguide lens for collimating or focusing a light beam comprising:

an optical waveguide having an end through which the light propagates and a diameter; and

a lens member integrally attached to and extending from the end of the optical waveguide, the lens member having a generally spherical lens portion, the lens member being fabricated from a borosilicate glass.

42-45. (Cancelled)

46. (Rejected) An optical waveguide lens assembly for collimating or focusing a light beam, the optical waveguide lens assembly comprising:

an optical waveguide having a core, a cladding, and an end; and

a lens member connected integrally to the end of the optical waveguide, the lens member having a throat portion and a lens portion, the optical waveguide being connected to the throat portion, the throat portion having a cross-sectional dimension that differs substantially from the diameter of the optical waveguide at or proximate to a point where the throat portion is connected to the end of the optical waveguide.

47. (Rejected) The optical waveguide lens assembly of claim 46 wherein the core of the optical waveguide is a glass having a softening point, and wherein the throat portion of the lens member is a glass having a softening point that is less than the softening point of the core of the optical waveguide.

48. (Rejected) The optical waveguide lens assembly of claim 47 wherein the lens member is fabricated from a borosilicate glass.

49. (Rejected) The optical waveguide lens assembly of claim 48 wherein the borosilicate glass is four weight percent (4 wt%) borosilicate glass.

50. (Rejected) The optical waveguide lens assembly of claim 46 wherein the cross-sectional dimension of the throat portion differs from the diameter of the optical waveguide by eight percent (8%) or more.

51. (Rejected) The optical waveguide lens assembly of claim 46 wherein the cross-sectional dimension of the throat portion differs from the diameter of the optical waveguide by sixty percent (60%) or more.

52. (Rejected) The optical waveguide lens assembly of claim 46 wherein the cross-sectional dimension of the throat portion differs from the diameter of the optical waveguide by ten microns or more.

53. (Rejected) The optical waveguide lens assembly of claim 46 wherein the cross-sectional dimension of the throat portion differs from the diameter of the optical waveguide by seventy-five microns or more.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.